DRAFT
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ENERGY DOUBLER RIPPLE REDUCTION AND REGULATION

Current ripple and regulation requirements for the Energy Doubler dictate that extensive measures be taken to reduce ripple and provide a high degree of regulation.

The large L/R time constant of the doubler magnet string aids in this effort, but ripple voltages applied to the ring must still be reduced significantly from that provided by the normal twelve-pulse SCR controlled power supplies.

A large passive filter will be provided at each power supply site. The filter will consist of a dual series choke (cheap choke) and shunt capacitor banks and tuned traps. The design of this filter is currently underway and is based on the existing cheap choke design. Use of active filters is not anticipated, but if required, then should be relatively small in size.

During ramping, the six dual energy-transfer power supplies will be voltage regulated with the total ring voltage split evenly around the ring. During injection and flat-top, the energy transfer supplies will be bypassed, with the holding power supply powering the ring. To provide minimum ripple voltage during flat-top, the holding power supply output voltage capability should be as small as possible since the ripple voltage is proportional to the power supply capability. To effect this, the dc voltage drop around the ring must be low at the 4300A flat-top current, dictating the use of heavy low resistance bus wherever the current must be carried in non-superconducting circuits (bus from ring to service buildings at power supply sites and at the bus dumping site). Ripple during flat-top will be controlled by this low holding power supply voltage requirement and this power supply's filter which may be more elaborate than those at the energy transfer units. Longer period regulation will be provided by local regulation hardware at the power supply, and if necessary, feed-forward techniques.

The regulation system requires considerable development, but is expected to be realizable without major expenditure of money.